

## **NINA OMANI**

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I am a hydrologist expert in eco-hydrologic modeling from sub-daily to the decadal time scale, field to continental scale, computational hydrology (hyper-parametrization, simulation, calibration & validation, regionalization, sensitivity analysis), geospatial hydrology, and water resources management. My research includes drought and flood risk assessment, transport of pollutants to assess surface and groundwater quality impacts, nitrate leaching under climate-induced exacerbated droughts, S2S and long-term streamflow forecasting.

As a scientist and postdoctoral researcher, I collaborated on projects with NASA (award number NA17OAR4320152, Optimized lake-treatment strategy), NOAA (National Water Model), USGS (Regional Calibration of a WRF-Hydro Model Using PEST++), BOR (NCAR proposal #2023-0133, S2S Streamflow Forecasting in the Lower Colorado River Basin), NCAR, and other institutions.

My technical expertise includes applications of remote sensing software (ENVI, ERDAS) in hydrology, GIS, geospatial data science, advanced AGOL (ArcGIS Online) web applications, and dashboard development through a professional job as a GIS specialist.

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## **EDUCATION**

### **Doctor of Philosophy, 2009-2014**

Major in Hydrology and Water Resources | Texas A&M University, College Station, TX, USA  
Regent Fellowship awarded.

*Dissertation: Evaluation of SWAT Snowmelt Algorithm and Assessment of Climate Change on Glacier Melt* ([Link](#)), Advisor: Raghavan Srinivasan ([Link](#))

### **Coursework toward Ph.D. (withdrawn), 2007-2008**

Major in Water Resources (*18 credit hours*) | Sharif University of Technology, Tehran, Iran

### **Master of Science in Civil Engineering, 2003-2006**

Major in Hydraulic Structures Engineering | Sharif University of Technology, Tehran, Iran

### **Bachelor of Science in Civil Engineering, 1998-2002**

Shahid Chamran University, Ahvaz, Iran

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## **Technical Skills**

### **Programming Languages | Computing Tools**

Big data and multi-dimensional data (NetCDF, Zarr, GRIB)

Code parallelization using Python/R packages

Batch processing, HPC System

R, RShiny, Python, NCL (NCAR Command Language), bash scripting, FORTRAN

### **ArcGIS and Remote Sensing**

ArcMap, ArcGISPro, ArcGIS Online, QGIS, ENVI

### **Hydrologic and Water Resources Tools**

SWAT (Soil and Water Assessment Tool)

WRF-Hydro, NOAA-MP  
DSSAT (Decision Support System for Agrotechnology Transfer)  
WEAP (Water Evaluation and Planning System )  
PEST++ (Model-Independent Parameter Estimation and Uncertainty Analysis)  
MODFLOW  
HEC-RAS, HEC-HMS

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## CERTIFICATE

### Certificate in Applied Statistics, 2024

Texas A&M University, Department of Statistics

*Courses: Bayesian Statistics, Spatial Statistics, Mathematical Statistics, Regression Analysis with R*

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## PROFESSIONAL EXPERIENCE

**National Center for Atmospheric Research, CO, USA** | May 2021–Present

Associate Scientist III

- Conduct hydrometeorological analyses of data products, including radar, NWP models, soil moisture, and streamflow data, to quantify skill and uncertainty in hydrologic predictions.
- Perform hydrologic model experiments using WRF-Hydro/NWM to assess the impact of meteorological forcing and land surface characterization datasets on hydrologic simulation and prediction skills.
- Develop ensemble hydrologic forecasting systems and perform hydrologic data assimilation.
- Use the Model Evaluation Toolkit (MET) and/or Rwrhydro for statistical evaluation.
- S2S streamflow forecasting, developing methodology, data analysis, and report writing.

**Syngenta Crop Protection Inc., NC, USA** | Jan 2018–Jan 2020

Postdoctoral Scientist

Developed web-accessible tools via R Shiny for exploring water quality characteristics and predicting pesticide concentrations. The tool saves time and cost of water quality data processing by chemists at Syngenta.

- Pesticide risk assessment using the EPA Aquatic models (PWC, KABAM, PFAM)
- Designed statistical approaches for data imputation and developed interactive dashboards for extreme concentration predictions.

More details: [portfolio](#)

**Texas A&M AgriLife Research, TX, USA** | Jan 2017–Sep 2017

Postdoctoral Research Associate

- [Simulating effects of winter wheat cover crop on soil water balances, soil quality and yield of subsequent cotton crop using DSSAT \(Decision Support System for Agrotechnology Transfer\).](#)
- [Determination of best irrigation termination date and harvesting date to optimize cotton yield and water use efficiency in North Texas.](#) [5,6,8]

**Purdue University, Department of Earth, Planetary, and Atmospheric Science, IN, USA**

| Jun 2014–Oct 2016

Postdoctoral Research Associate

- Predicted and simulated hydrologic components (surface runoff, sub-surface flow, groundwater, streamflow, and snow melt), nutrients and sediments transportation, water quality, and erosion in a large watershed on Purdue Supercomputer RCAC [28,34].
- Assessed the effect of climate change on water quality and quantity in the US Midwest [29,30].
- Assessed spatiotemporal variation of present and future drought events characteristics using the Copulas joint probability approach [34].
- Evaluated the current ecosystem services such as food and freshwater provisioning under extreme climate conditions in the upper Mississippi River basin [10].

**Extension Specialist (Geospatial Analyst)**

Texas A&M AgriLife Extension, Houston, TX | Feb 2020–Present

- Modeled urban watersheds in Texas to assess the effects of Low Impact Development on NPS loading.
- Developed educational ArcGIS Online (AGOL) web applications to transfer research knowledge to the public.
- Developed GIS toolbox and packages using Arcpy, and geospatial data analysis (census, habitat, FEMA flood data, weather data).
- Developing social vulnerability ([SOVI](#)) index over the FEMA flood zones and visualization in AGOL applications.

**Graduate Research Assistant**

Texas A&M University, Spatial Sciences Laboratory, College Station, TX, USA | 2009–2014

- Conducted land use classification using SVM in ENVI, derived vegetation biophysical parameters, and processed airborne imagery for my Ph.D. research.

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**PUBLICATIONS AND CONFERENCE PAPERS**

1. A. Rafieeiasab, A. Dugger, A. Mazrooei, T. Enzminger, I. Srivastava, D. Gochis, K. Sampson, N. **Omani**, J. Grim, Y. Zhang, J. LaFontaine, R. Viger, Y. Liu, Tim Schneider. A WRF-Hydro-based retrospective simulation of water resources for U.S. integrated water availability assessment. (Under review).
2. A. Rafieeiasab, Michael N. Fienen, **Nina Omani**, Ishita Srivastava, Aubrey Dugger [Ensemble Methods for Parameter Estimation of WRF-Hydro](#). Manuscript # 2024WR038048. U.S. Geological

Survey (USGS): Cooperative Agreement 1852977 (Under review).

3. Kessler, J., E. Espey, A. VanDeWeghe, A.D. Gronewold, T. Sorensen, B. Khazaei, E. James, T. Smirnova, M. Casali, D. Yates, **N. Omani**, J. Kelley, M. Barlage, S. Benjamin, E. Anderson. Depth Matters: Lake Bathymetry Selection in Numerical Weather Prediction Systems (Under review).
4. Qingyu Feng, Liding Chen, Lei Yang, Haw Yen, Ruoyu Wang, Feng Wu, Yang Feng, Cibin Raj, Bernard A. Engel, **Nina Omani**, Panagiotis D. Oikonomou, Asim Zia, A. (2023) distributed model parameter optimization toolbox performing multisite calibration in the lump and distributed mode for the SWAT model, *Environmental Modelling & Software*, Volume 168, 105785, ISSN 1364-8152, <https://doi.org/10.1016/j.envsoft.2023.105785>.
5. Himanshu S.K., Ale S., Bordovsky J.P., Kim J., Samanta S., **Omani N.**, Barnes E. (2021) Assessing the impacts of irrigation termination periods on cotton productivity under strategic deficit irrigation regimes. *Nature Scientific Reports* 11 (1), 1-16. <https://doi.org/10.1038/s41598-021-99472-w>
6. Ale S., **Omani N.**, Himanshu S.K., Bordovsky J.P., Thorp K.R., Barnes E.M. (2020) Determining optimum irrigation termination periods for cotton production in the Texas High Plains. *Transactions of the ASABE* 63 (1), 105-115
7. Feng Q., Chaubey I., Cibin R., Engel B., Sudheer K.P., Volenec J., **Omani N.** (2018) Perennial biomass production from marginal land in the Upper Mississippi River Basin. *Land Degrad Dev.* 1–8
8. Adhikari P., **Omani N.**, Ale S., De Laune P., Thorp K., Hoogenboom G., Barnes E. (2017) Simulated effects of winter wheat cover crop on cotton production system of the Texas Rolling Plains. *Transactions of the ASABE, Crop Modeling Special Collection. Transactions of the ASABE* 60(6)
9. **Omani N.**, Srinivasan R., Karthikeyan R., and Smith P. K. (2017) Hydrological modeling of highly glacierized basins (Andes, Alps, and Central Asia). *Water*, 9(2)
10. Li P., **Omani N.**, Chaubey I., and Wei X. (2017) Evaluation of drought implications on ecosystem services: freshwater provisioning and food provisioning in the Upper Mississippi River Basin. *Int. J. Environ. Res. Public Health*, 14(5), 496
11. **Omani N.**, Srinivasan R., Smith P. K. and Karthikeyan R. (2017) Glacier mass balance simulation using SWAT distributed snow algorithm. *Hydrological Sciences Journal*, 62(4)
12. Anandhi A., **Omani N.**, Chaubey I., Horton R., Bader D. and Nanjundiah, R. (2016) Synthetic scenarios from CMIP5 model simulations for climate change impact assessment in managed ecosystems and water resources: case studies in south Asian countries. *Transactions of the ASABE*, 59(6), 1715- 1731.
13. **Omani N.**, Srinivasan R., Karthikeyan R., Venkatta K. and Smith P. K. (2016) Impacts of climate change on the glacier melt runoff from five river basins. *Transactions of the ASABE*, 59(4).
14. Kannan, N., **Omani, N.** and Miranda, R. (2014) Water quality modeling of an agricultural watershed with best practices. *IJRET*, (3)1, 553-564.
15. **Omani N.**, Srinivasan R., and Lee T. (2013) Estimation of sediment and nutrient loads to bays from gauged and un-gauged watersheds. *Applied Engineering in Agriculture*, 30(6), 869.
16. Lee T., Srinivasan R., Moon J. and **Omani N.** (2011) Estimation of fresh water inflow to bays from gaged and ungaged watersheds, *ASABE, Applied Engineering in Agriculture*, 27(6), 917–923.
17. **Omani N.**, Tajrishy M. and Abrishamchi A. Modeling a river basin using SWAT model and SUFI-2. Conference paper, 4th International SWAT Conference, The Netherlands. 2007.
18. **Omani N.**, Tajrishy M., and Abrishamchi A. Modeling a river basin using SWAT model and GIS. Conference Paper, 2nd International Conference on Managing Rivers in the 21st Century: Solutions Towards Sustainable River Basins, Kuching, Sarawak, Malaysia. 2007.

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## PRESENTATIONS

19. Alexander VanDeWeghe, E. Espey, J. A. Kessler, T. Sorensen, A. Gronewold, E. J Anderson, D. N. Yates, **Omani N.**, S. Benjamin, B. Khazaei, T. G. Smirnova, J. GW Kelley, M. Casali, AGU Fall Meeting Abstracts, 2023, San Francisco, CA.
20. David Gochis, A. Rafieeiniasab, A. L. Dugger, Y. Zhang, K. M. Sampson, E. Towler, **Omani N.**, D. N. Yates, A. H. Mazrooei, T. Schneider, R. Rasmussen, F. Chen, J. Grimm. Development and evaluation of a WRF-Hydro based retrospective simulation of CONUS water resources for the USGS Integrated Water Availability Assessment, AGU Fall Meeting Abstracts, 2023, San Francisco, CA.
21. Eric James, T. G Smirnova, S. Benjamin, J. A. Kessler, A. Gronewold, E. Espey, T. Sorensen, B. Khazaei, J. GW Kelley, D. N Yates, E. J. Anderson, **Omani N.**, D. K. Hall, C. Alexander. Testing an upgraded bathymetric dataset in 1-D lake models in a two-way coupled land-atmosphere model. AGU Fall Meeting 2022, held in Chicago, IL, 12-16.
22. Eamon Espey, J. Andrew Kessler, A. Gronewold, E. J Anderson, **Omani N.**, D. N Yates, T. Sorensen, S. Benjamin, M. Casali, B. Khazaei, Exploring performance of an upgraded bathymetry dataset in 1-D lake models, AGU Fall Meeting 2022, held in Chicago, IL, 12-16.
23. **Nina Omani**, D. Yates, A. Dugger, T. Enzinger, Evaluation of the WRF-Hydro 1-D Lake Physics Module in Simulating Lake Dynamics and Vertical Water Temperature Profiles, AGU Fall Meeting 2022, held in Chicago, IL, 12-16.
24. Himanshu S.K. (speaker), Ale S., **Omani N.**, Bordovsky J.P., Thorp R.K., Barnes E.M. Evaluation of irrigation termination effects on cotton yield and water use efficiency under deficit irrigation strategies in the Texas High Plains. Paper#1900799. ASABE Annual International Meeting, Boston, July 7-10, 2019.
25. Ale S. (speaker), Himanshu S.K., **Omani N.**, Bordovsky J.P., Thorp R.K., Barnes E.M. A Modeling approach to determine optimum irrigation termination periods for cotton. ASA-CSSA-SSSA International Annual Meeting, San Antonio, Texas, Nov. 10-13, 2019.
26. Ale S. (speaker), **Omani N.**, Bordovsky J., Adhikari P. and Thorp K. Water use efficiency and cotton yield as affected by irrigation termination dates. Cotton Agronomy, Physiology & Soil Conference, Beltwide Cotton Conferences. January 2018.
27. Ale S. (speaker), Adhikari P., **Omani N.**, De Laune P., Thorp K., and Barnes E. Simulated effects of winter wheat cover crop on soil water balances, soil quality and yield of subsequent cotton crop. Paper#1701253. ASABE Annual International Meeting, Spokane, Washington, Jul 16-19, 2017.
28. Chaubey, I. (speaker) and **Omani, N.** Climate change and food production in US Midwestern watersheds. Engineering and Technology Innovation for Global Food Security. An ASABE Global Initiative Conference, Cape Town Stellenbosch, South Africa. 24-27 October 2016.
29. **Omani N.** (speaker) and Chaubey, I. Assessing sensitivity of two Indian river basins water quality, quantity, and agriculture to drought, ASABE Annual International Meeting, Orlando, FL. Jul 17-20, 2016.
30. **Omani N.** (speaker) and Chaubey, I. Effects of droughts on two Indiana river basins' water quality and quantity. 10<sup>th</sup> International Symposium on Agriculture and the Environment, West Lafayette, IN. May 23-27, 2016.
31. Anandhi A. (speaker), **Omani N.**, Chaubey I., Horton R., Bader D. and Nanjundiah, R. What changes do the CMIP5 climate models predict for South Asia and what are some potential impacts on managed ecosystems and water resources. ASABE 1st Climate Change Symposium: Adaptation and Mitigation, Chicago, IL. May 3-5, 2015.
32. Li, P. (speaker), **Omani, N.**, Chaubey I. and Wei X. Impact of drought on freshwater provisioning ecosystem services in the Upper Mississippi River Basin. International SWAT Conference, West Lafayette, IN. October 12-16, 2015.
33. Logsdon R. (speaker), **Omani N.**, Cibir R., Chaubey I. and Srinivasan, R. The future of ecosystem

services in the upper Mississippi River basin. ASABE 1st Climate Change Symposium: Adaptation and Mitigation. Chicago, IL. May 3-5, 2015.

34. **Omani, N.** (speaker), Chaubey, I., and Li, P. Assessing sensitivity of UMRB agriculture and water resources to past and current drought. SWAT Conference, West Lafayette, IN. October 12-16, 2015.
  35. **Omani, N.** (speaker), Srinivasan R. and Lee T. *Estimating sediment and nutrient loads of Texas coastal watersheds with SWAT*. ASABE Annual International Meeting, Dallas, TX. July 17-20, 2012.
  36. **Omani N.** (speaker), Tajrishy M. and Abrishamchi A. (2007). *Modeling a river basin using SWAT model and SUFI-2*. Paper presented at the Book of Abstracts of the 4th International SWAT Conference, The Netherlands.
  37. **Omani N.** (speaker), Tajrishy M., and Abrishamchi A. (2007). *Modeling a river basin using SWAT model and GIS*. Paper presented at the 2nd International Conference on Managing Rivers in the 21st Century: Solutions Towards Sustainable River Basins, Kuching, Sarawak, Malaysia.
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## SERVICE

- **[Scientific Committee Member \(SESSION I3: LARGE SCALE APPLICATIONS\), Conference Moderator & Organization Committee Member](#)**  
International SWAT Conference, Purdue University, 2015.
  - **Instructor**  
Soil and Water Assessment Tool (SWAT) Workshop for Beginners, Purdue University, 2015.
  - **Guest Reviewer** ([Link](#))
  - **Mentorship:** Mentored a PhD candidate, Ping Li, Purdue University, 2014-2016
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## WORK AUTHORIZATION

- **Status:** U.S. Citizen